# Introduction to Smart Cities

SMART Cities Certificate Program

**Are you prepared to succeed in a SMART workforce?**

**Upgrade your skills and prepare to advance in a SMART economy.**

**This course will provide...**

- Insight on the role of city leadership and governance
- Information on the challenges associated with implementing Smart Cities
- Examples of the role technology, data, and urban analytics play in forming Smart Cities

**Course No: CED-338-49226**

**June 6 - July 25, 2019**
**Tuesdays & Thursdays**
**6:00 PM - 9:00 PM**
**Cost: $275**

Center for ENTREPRENEURIAL DEVELOPMENT
PRINCE GEORGE'S COMMUNITY COLLEGE

**Register today @ www.pgcc.edu**
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*Course:* **Introduction to Smart Cities**

*Course description:*

*Course duration: 45 hours*

This course is an introductory course in developing and implementing a smart city. The course will examine what a smart city is, how it can transform the lives of its citizens in urban environments, the role of city leadership and governance, the role of technology, data and urban analytics in forming a smart city, as well as the challenges associated with implementing a smart city.

*Course Learning Objectives:*

After completing this course, the student will be able to:

1. Recognize the challenges and opportunities cities face; discuss smart city definitions and what they have in common; describe some different approaches to smart city design and delivery.
2. Describe how the use of technology can improve the livability, workability, and sustainability of our urban communities;
3. Identify the types of technology that can deploy a wide range of sensors and internet nodes across urban landscapes, for the purposes of traffic management, air quality monitoring, crime prevention, cyber-security, and other data gathering purposes.
4. Identify how cities use technology to facilitate efficient transportation infrastructures, housing and industry, and utilities such as electricity, water, sewer, and other key elements.
5. Identify the areas of the government that need to be connected by the Internet of Things both internally (budgeting, procurement, contract management, etc.) and externally (external partners such as police, fire, emergency, sectors of the federal government, etc.)

*Course Requirements:*

The student will be using a variety of resources (scholarly articles and e-book chapters found in the PGCC library) to build a foundation in what a Smart City is. The course will be taught reviewing current literature in the field, examining case-studies on various challenges other cities have encountered. Finally, the student will have a project, for the duration of the course, asking them to build a model for a smart city. Two exams will be given during the course to assess the students' understanding of the concepts associated with the Smart City.

*Course:* **Business Process Improvement & Information Systems**

*Course duration:* 24 hours

*Course description:*

Business process improvement is a key skill set managers and professionals need to reduce costs, shorten service/cycle time, enhance customer value, and deploy results-oriented solutions within their organizations.

After completing this course, the student will be able to:

1. Determine how business Processes, information systems and big data analytics relate.
    a. Urban Informatics - Role of business in solving Smart Cities Challenges
    b. Leveraging technology to improve IS in transportation, energy, food, living, and workplace
    c. Using tools to evaluate business processes, IS, and Data Integrity
2. Demonstrate process management for efficient business operations
    a. Competitive Market Strategy
    b. Organizational Strategy and Business Models
    c. Developing Smart Cities Solutions through Fundamentals of DevOps Maximize the use and impact of innovation and technology
3. Integrate business, government, and philanthropy – How P4s Impact Smart Cities
    a. Business – Leading Technology and Innovation in Smart Cities
    b. Government – Setting Public Policy, Government Regulations and Authority
    c. Social Impact Investing – Aligning Funders, Banks and Opportunity Zones
4. Utilize Operational Models
    a. Systems Thinking
    b. Design Thinking
    c. Applied Intelligence and Digital Transformation
    d. Managing Business Process Risks
        i. Assessing risks and data collection

ii. Analyzing risk data

iii. Proposing solutions

iv. Reducing technology costs

5. Utilize information systems to grow Smart Cities markets
    a. Developing Markets
    b. Expanding Markets
    c. Transforming Markets
6. Introduce business intelligence and resiliency
    a. Cyber resilience and data breach
    b. Disaster recovery
    c. Business disruption
    d. GDPR and change management

*Course Requirements:*

This course provides students with an interactive learning approach. The course curriculum includes a variety of exercises, activities, and discussions. The resources and material used for this course includes worksheets, periodicals, and other course materials relevant to current events.

***** This course was developed by APB & Associates***

*Course:* **Internet of Things Fundamentals**

*Course duration:* 3 credit hours

*Course description:*

The Internet of Things (IoT) Fundamentals course explores how everyday devices are being integrated with the Internet and data analytics to serve the needs of society. It introduces key components of the IoT architecture, network protocols, applications and technologies. In addition, it provides a high level overview of cyber physical systems, sensor technologies, cloud computing, data storage, data mining and business analytics, as well as security and privacy challenges associated with IoT. Numerous IoT applications - use cases – are surveyed with respect to software and hardware technologies employed.

*Course Learning Objectives:*

Upon successful completion of this course, the student will be able to:

1. Identify the various types of Internet of Things (IoT) applications and their impact on society
2. Enumerate key hardware and software components, and topologies within the IoT architecture.
3. Identify wireless and wired communication protocols and technologies used in IoT.
4. List the various types of sensors and sensor technologies used in IoT applications.
5. Explain the role of cloud computing, cloud storage, data mining, and business analytics in IoT.
6. Identify IoT security challenges.
7. Identify privacy issues and challenges associated with IoT.

*Course Requirements:*

1. Explore IoT applications
2. Survey the impact of IoT applications on society
3. Explore the IoT architecture
4. Identify wired and wireless communication protocols
5. Explore usage of sensor technologies in IoT
6. Explore software used in IoT

7. Explore the role of Big Data in IoT
8. Explain the role of data mining in IoT
9. Explain the role of business analytics in IoT
10. Explore the role of cloud computing in IoT
11. Explore security aspects and challenges in IoT
12. Explore privacy challenges in IoT

*Course:* **Data Process & Visualization**

*Course duration:* 45 hours

*Course description:*

Data visualization is a tool that businesses and government at all levels can use to track data, communicate metrics, and better serve customers and citizens. Through these courses, students learn how city government can make use of data visualization to make intelligent economic and strategic decisions.

*Course Learning Objectives:*

After completing this course, the student will be able to:

1. Identify Basics of Data Visualization – Prototyping IoT Data
    a. Artificial Intelligence
    b. Virtual Reality
    c. Augmented Reality
    d. Mixed Reality
    e. Machine Learning
2. Apply Visualization to Big Data Analytics
    a. 3D Mapping and GIS
    b. 5D Moving from Data Capture to IS
    c. Predictive analytics for municipalities
    d. Sensors and M2M Communication
    e. Traffic Forecasting
3. Explain Data-based City Planning and Data Ecosystems
4. Explain M2M Communication (Machine to Machine Communication)
5. Demonstrate Resiliency –Avoid Data Breaches through Visualization
    a. Smart Data for Smart Cities
    b. Secure Data for Safety and Transparency

c. Apply Sustainable Data for Continuous Improvement

*Course Requirements:*

This course provides students with an interactive learning approach. The course curriculum includes a variety of exercises, activities, and discussions. The resources and material used for this course includes worksheets, periodicals, and other course materials relevant to current events.

**SMART CITIES WORKFORCE DEVELOPMENT**
**RESOURCES AND PEDAGOGY**

**Hamilton and Ximon** (2017, Spring). **Funding and Financing Smart Cities**. Journal of Government Financial Management, (66)1, 26-33. Retrieved from: https://exproxy.pgcc.edu/login?url=https://search.proquest.com/docview/2101237301?accountid=13315.

Abbreviated Abstract: Government financial officers can play a key role in enabling city reinvestment and modernization using fiscal policy, public private partnerships (PPPs), and performance-based revenue models as important levers to catalyze economically impactful capital investments that create long-term value for the city, citizens and business. These PPPs and performance revenue models are discussed throughout the article.

**Hosseinian-Far, Amin, Muthu Ramachandran, and Charlotte Lilly Slack**. "Emerging trends in cloud computing, big data, fog computing, IoT and smart living." *Technology for Smart Futures*. Springer, Cham, 2018. 29-40.

Abbreviated Abstract: Cloud computing has emerged to address the needs of businesses and to improve the quantity and quality of data that we can collect and analyse from multiple sources and devices. Cloud computing has also revolutionised the software paradigm by changing into a service-oriented paradigm where cloud resources and software are offered as a service….This chapter will also outline the foundations of cloud computing and then endeavours to draft the emerging trends and evolution of cloud applications. The emerging trends will include new services, federations of cloud paradigm, smart cities, big data, IoT and mobile cloud.

**Manlio, D. G.** (2016). Discovering the internet of things (IoT) within the business process management. *Business Process Management Journal, 22*(2), 263-270. doi:http://dx.doi.org/10.1108/BPMJ-12-2015-0173

Abbreviated Abstract: We still know very little about how the Internet of Things (IoT) is changing the way of interpreting the business process management inside and outside firms and this topic is progressively becoming increasingly hot in the leading managerial literature (Al-Mashari and Zairi, 2000). Furthermore, management scholars are aiming at investigating the impact and the role of the IoT on the business process management in terms of promotion of knowledge flow, innovation and competitiveness. The purpose of this paper is to offer a literature review on the topic, by considering the technological revitalization through the IoT as a key driver for the business process management of the industrial firm.

**Miller, Michael**. (2015). The Internet of Things: How Smart TVs, Smart Cars, Smart Homes & Smart Cities Are Changing the World, E-book. http://pgcc.summon.serialssolutions.com/#!/search?bookMark=ePnHCXMwbV1fC8IgEB9E0L99h4teGzR1U3uLUey9sdfhlvZUgzbo63fnth6iJ088RE7R--l5v1UQGorNfvb-Dxd9bEYvA1EKbpZiNmS8kUrLhBbP4nsbIumgVcvgjtaB4TLM9tA6GOgrj5C3b7g-0JxQlN1-FDMEf5NMtOJYQfw9NfqUpHB6WfCR-tgP4MDAR6lsgrnD-bXhWK6D8nIusjwaKQgig-cgPZKmnNUNYgLFGxXLOqGgUFy0B2HIeY9r7n-StLBOOM5OkPG2YFbcDt5JLrQWxJmyHjjvjEP1W5Dt3FVlhsgrxde3-6MQ_Wh9a61_l

Abbreviated Abstract: Michael Miller shows how connected smart devices will help people *do more, do it smarter, do it faster*. He also reveals the potential risks—to your privacy, your freedom, and maybe your life.

**Morse, Suzanne**. (2014) Smart Communities: How Citizens and Local Leaders Can use Strategic Thinking to Build a Brighter Future. E-book

Abbreviated Abstract: Based on the results of more than a decade of research by the Pew Partnership for Civic Change, Smart Communities provides directions for strategic decision-making and outlines the key strategies used by thousands of leaders who have worked to create successful communities.

**Smith and Ptoe** (2017, Feb) **Smart Cities and Communities**. ITE Journal, Washington Vol. 87, Issue: 2 (Feb 2017): 36-38..

Abbreviated Abstract: The US' transportation system is facing a period of revolutionary changes. The US Department of Transportation (USDOT) is investing in the advancement and widespread deployment of innovative and life-saving technologies….The Smart City Challenge called for more than merely introducing new transportation technologies. It required bold new solutions that would change the face of transportation by closing the gap between rich and poor; capturing the needs of both young and old; and bridging the digital divide through smart design so that the future of transportation meets the needs of all.

**Silva, B. N., Khan, M., Jung, C., Seo, J., Muhammad, D., Han, J., . . . Han, K.** (2018). Urban planning and smart city decision management empowered by real-time data processing using big data analytics. *Sensors (Basel, Switzerland), 18*(9), 2994. doi:10.3390/s18092994

Abbreviated Abstract: The Internet of Things (IoT), inspired by the tremendous growth of connected heterogeneous devices, has pioneered the notion of smart city. Various components, i.e.,

smart transportation, smart community, smart healthcare, smart grid, etc. which are integrated within smart city architecture aims to enrich the quality of life (QoL) of urban citizens. However, real-time processing requirements and exponential data growth withhold smart city realization. Therefore, herein we propose a Big Data analytics (BDA)-embedded experimental architecture for smart cities.

**Videos (partial list):**

**Video: Lafayette A Smart City."** ***Local Broadcast Video Content***, 5 Jan. 2017. *General OneFile*, http://link.galegroup.com/apps/doc/A476565320/ITOF?u=pgcc_main&sid=ITOF&xid=0aefe91e. Accessed 8 Feb. 2019.

"**Video: Smart city initiative focuses on smart technology in everyda**." *Local Broadcast Video Content*, 19 Aug. 2017. *Academic OneFile*, http://link.galegroup.com/apps/doc/A501035924/AONE?u=pgcc_main&sid=AONE&xid=d0aabc26. Accessed 8 Feb. 2019.

**"Video: City of Memphis Launches 'Smart Government' App**." *Local Broadcast Video Content*, 9 July 2012. *Academic OneFile*, http://link.galegroup.com/apps/doc/A295790864/AONE?u=pgcc_main&sid=AONE&xid=d1d6ff5a. Accessed 8 Feb. 2019.

"**Breaking the Wall of Uninformed Cities: How Open Data Makes Urban Life Smarter**." Films Media Group, 2012, digital.films.com/PortalPlaylists.aspx?wID=9387&xtid=53582. Accessed 8 Feb. 2019.